RESEARCH PROBLEM STATEMENT

Problem Title: **Development of MSE wall inspection plan based on failure mode analysis and risk assessment** No.: 06.07-10

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1. Briefly describe the problem to be addressed:

U-DOT has a large and growing inventory of MSE walls. These walls are a critical part of the State's transportation infrastructure. Nearly all of the critical structure of an MSE wall is buried, where it is difficult to assess its condition. Additionally, MSE walls are complicated systems where failures in several different components can lead to failure in the walls. U-DOT has variety of different types of MSE walls, which have different vulnerabilities. In order to identify and correct any problems that might arise with these walls, U-DOT needs a systematic inspection and monitoring program. We propose to develop such a program. This program will be developed based upon a probabilistic risk assessment analysis that accounts for the probabilities and consequences of failure. A panel of experts from U-DOT, the MSE wall industry, FHWA, and academia, will be assembled to determine the possible failure modes, the probabilities of failure, and the consequences of failure. Develop a failure modes analysis data base.

2. List the research objective(s) to be accomplished:

1. Develop a catalogue of U-DOT MSE walls.
2. Compile a history of MSE wall failures.
3. Assemble an expert panel to a) determine failure modes, b) assign probabilities to each failure mode, and c) evaluate the consequences of each failure mode.
4. Perform probabilistic risk assessment to identify the failure modes that contribute a significant risk for each type of wall in the U-DOT inventory.
5. Develop Failure modes analysis data base.

3. List the major tasks required to accomplish the research objective(s):	**Estimated person-hours**
1. Develop a catalogue of U-DOT MSE walls	120 hrs
2. Compile history of MSE wall failures	60 hrs
3. Assemble expert panel and provide them with catalogue and historical data	40 hrs
4. Limited field investigation to evaluate current condition of steel reinforcement	100 hrs
5. Prepare for expert panel meeting	20 hrs
6. Conduct two day expert panel meeting	48 hrs
7. Prepare report on panels findings	20 hrs
8. Perform risk assessment analysis to identify the most critical failure modes	80 hrs
9. Develop inspection and monitoring plan to mitigate risk	100 hrs
10; Train U-DOT personnel to implement the inspection and monitoring plan	60 hrs
11. Submit final report to U-DOT	30 hrs

4. Outline the proposed schedule (when do you need this done, and how we will get there):

May-Aug 2006 Prepare for panel meetings (Tasks 1-5)
Sep 2006 Conduct panel meeting (Tasks 6-7)
Oct-Nov 2006 Perform risk assessment (Task 8)
Dec 2006- Jan 2007 Develop inspection and monitoring plan (Task 9)
Feb 2007 Conduct training for U-DOT personnel (Task 10)
Apr 2007 Submit final report to U-DOT

5. Indicate type of research and / or development project this is:

Large: ☐ **Research Project** ☒ **Development Project**
Small: ☐ **Research Evaluation** ☐ **Experimental Feature** ☐ **New Product Evaluation** ☐ **Tech Transfer Initiative** :
☐ **Other** _____

6. What type of entity is best suited to perform this project (University, Consultant, UDOT Staff, Other Agency, Other)?

7. What deliverable(s) would you like to receive at the end of the project? (e.g. useable technical product, design method, technique, training, workshops, report, manual of practice, policy, procedure, specification, standard, software, hardware, equipment, training tool, etc.)

1) Catalogue of U-DOT MSE walls, 2) History of MSE wall failures, 3) Report on expert panel findings, 4) Detailed MSE wall inspection and monitoring plan, 5) Training sessions for U-DOT personnel, and 6) Final report.

8. Describe how will this project be implemented at UDOT.

The project data base will be provided to UDOT with direction on it use and recommendation for further analysis and use.

9. Describe how UDOT will benefit from the implementation of this project, and who the beneficiaries will be.

U-DOT will benefit by having tools to asses the condition of the MSE walls in their inventory. Problems with the wall should then be identified early enough to allow for corrective actions prior to catastrophic failures.

10. Describe the expected risks, obstacles, and strategies to overcome these.

There are no particular risks in this work.

11. List the key UDOT Champion of this project (person who will help Research steer and lead this project, and will participate in implementation of the results): Jon Bischoff

12. Estimate the cost of this research study including implementation effort (use person-hours from No. 3): $40,000

13. List other champions (UDOT and non-UDOT) who are interested in and willing to participate in the Technical Advisory Committee for this study:

	Name	Organization/Division/Region	Phone	Attended UTRAC?
A)	Jon Bischoff, Geotech			
B)	Jim Higbee, Legacy			
C)				
D)				
E)				
F)				
G)				

14. Identify other Utah agencies, regional or national agencies, or other groups that may have an interest in supporting this study:

FHWA